

**What is claimed is:**

1. A communications apparatus using an adaptive antenna having in a high frequency unit an antenna unit including a plurality of antenna elements and a plurality of adjustment units provided corresponding to the plurality of antenna elements for adjusting directivity of an entire antenna, comprising:

10 an interference wave element extraction unit extracting an interference wave element other than a requested signal to be received by said communications apparatus from a received signal by the antenna unit when an adjustment value of the adjustment unit is perturbed in a 1 symbol time used in said communications apparatus; and

15 an adaptive control unit performing adaptive control on the adjustment value such that the extracted interference wave element can be minimized.

20 2. The apparatus according to claim 1, wherein:  
the plurality of antenna elements comprise a feed antenna element and one or more no-feed antenna elements near the feed antenna element;

the adjustment unit is a variable reactance circuit unit connected to each no-feed antenna element; and

the adjustment value is a variable reactance value.

3. The apparatus according to claim 1, wherein:

the adjustment unit is a weight unit corresponding to each of the plurality of antenna elements;

the antenna unit further comprises a composing circuit unit for composing a weighted signal from each antenna element; and

the adjustment value is a weight value of the weight unit.

4. The apparatus according to claim 1, wherein

said communications apparatus converts a transmission data sequence into a parallel data sequence, and each of the converted data sequences is transmitted in parallel by a plurality of carriers having different frequencies; and

said interference wave element extraction unit extracts as the interference wave element a virtual subcarrier element as a carrier not used in data

communications in a plurality of carriers.

5.     The apparatus according to claim 1, wherein  
       said interference wave element extraction unit  
5     extracts an interference wave element using a  
       result of a Fourier transform of a digitized signal  
       of the received signal.
6.     The apparatus according to claim 1, wherein  
10     said interference wave element extraction unit  
       extracts an interference wave element using a  
       result of a Wavelet transform of a digitized signal  
       of the received signal.
- 15     7.     The apparatus according to claim 1, wherein  
       said interference wave element extraction unit  
       extracts an interference wave element using  
       received data obtained when the adjustment value is  
       perturbed in one of two symbols and received data  
20     obtained when the adjustment value is not perturbed  
       in the other symbol.
8.     The apparatus according to claim 7, wherein  
       said interference wave element extraction unit  
25     uses received data obtained by repeatedly

perturbing each adjustment value of the plurality of adjustment units for each sample in one symbol.

9. The apparatus according to claim 7, wherein

5       said interference wave element extraction unit uses received data obtained by sequentially and continuously perturbing each adjustment value of the plurality of adjustment units for a plurality of samples in one symbol.

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10. The apparatus according to claim 1, wherein

      said interference wave element extraction unit extracts an interference wave element from the received signal obtained in a format in which a  
15       section of perturbing an adjustment value of the adjustment unit in the one symbol and a section of not perturbing any adjustment value of a plurality of adjustment units are included .

20       11. The apparatus according to claim 1, wherein

      said communications apparatus comprises the antenna unit, the interference wave element extraction unit, and the adaptive control unit;

      the antenna unit comprises a plurality of  
25       diversity branches provided in spatially different

positions; and

said communications apparatus further comprises a weight composite unit for weight composing a signal from each diversity branch.

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12. The apparatus according to claim 11, wherein the adaptive control unit is in each of the plurality of diversity branches, and independently performs control of each adjustment value.

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13. The apparatus according to claim 11, further comprising

a cooperative control unit performing cooperative control of each adaptive control unit for each adaptive control unit in the plurality of diversity branches.

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14. The apparatus according to claim 1, further comprising

an adjustment value setting unit setting to a predetermined value an adjustment value of an adjustment unit other than a part of adjustment units so that an influence of adjustment by a part of adjustment units can be evaluated in the plurality of adjustment units.

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15. The apparatus according to claim 1, wherein  
said adaptive control unit performs control of  
the adjustment value in a steepest gradient method.

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16. A communications apparatus using an adaptive  
antenna having in a high frequency unit an antenna  
unit including a plurality of antenna elements and  
a plurality of adjustment units provided  
10 corresponding to the plurality of antenna elements  
for adjusting directivity of an entire antenna,  
comprising:

interference wave element extraction means for  
extracting an interference wave element other than  
15 a requested signal to be received by said  
communications apparatus from a received signal by  
the antenna unit when an adjustment value of the  
adjustment unit is perturbed in a 1 symbol time  
used in said communications apparatus; and

20 adaptive control means for performing adaptive  
control on the adjustment value such that the  
extracted interference wave element can be  
minimized.